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(54) Subscriber Device for Video Telephony

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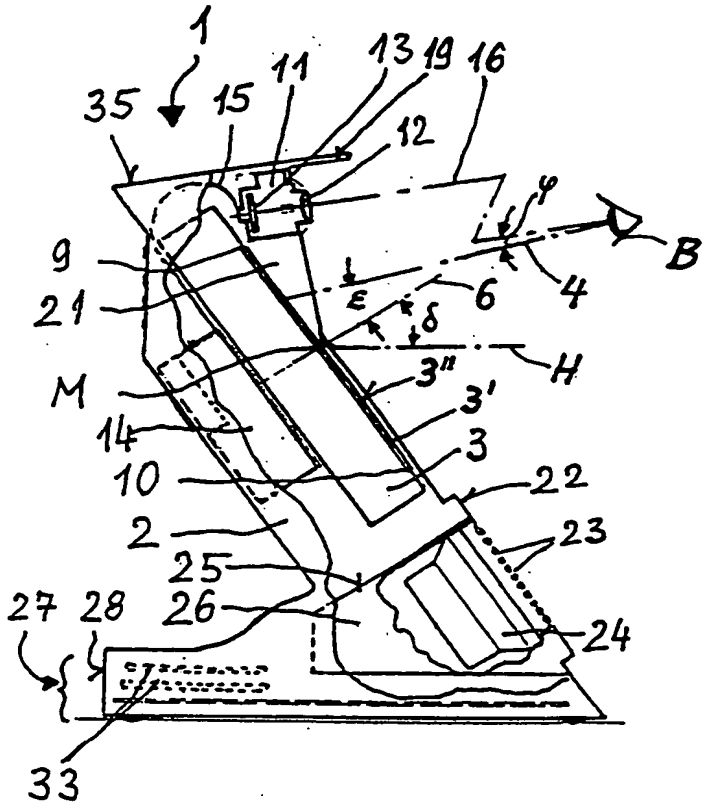
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SUBSCRIBER DEVICE FOR VIDEO TELEPHONY

Technical Field

The invention concerns a subscriber device for video telephony and, more particularly, a backwards inclined display with a video camera.

Background of the Invention

Such a subscriber device is known from EP 0 309 341 A1. The device has two housings linked by a pivot joint, one of which forms the base on the table and contains the circuits and control elements, while the other pivots open and contains a monitor and a camera. When folded closed, the two housings form a compact, cube-shaped device. When the top housing pivots open around the linkage located on the rear edge, the user sees a monitor located on one side near the top edge. The camera is built-in immediately next to it, and is rotated 90° to save space, so that the light rays coming from the user must be rerouted by a mirror placed before the lens. By changing the angle of inclination of the top housing, the device can be adjusted for persons of different height.

In addition, video telephones are known in which the parallax between camera and display device is zero, because the paths of the rays are converged by mirrors in relation to the user, e.g. from DE 36 00 914 A1. However, since the mirror converging the rays is semitransparent, optical errors and light losses, which occur naturally with this mirror in both the reflection and transmission modes, must be accepted. Furthermore, with the use of large display screens, e.g. with a diagonal size of 14 inches or more, the size of the partially transparent mirror, which corresponds approximately to that of the display screen, is large and the mirror is proportionally too expensive. This also causes the housings to be correspondingly large and unwieldy.

Disclosure of Invention

The invention has an object of creating a convenient, compact subscriber device for video telephony of the kind described earlier, in which, on the one hand, light losses through semitransparent mirrors are avoided, and on the other the vision contact line between calling partners is not impaired by an excessively large parallax.

According to a first aspect of the present invention, a backwards inclined video telephony display screen and an adjacent video camera, whose path of rays is directed towards the user has the recording part of the video camera, which comprises the lens and the image converter, located separately from the camera electronics immediately above the top edge of the display screen or immediately next to the lateral edge of the display screen, and has the camera electronics located behind the picture screen.

In further accord with the first aspect of the present invention, the image surface of the picture screen is inclined in such a way with respect to the horizontal, that the distance between the user and the top edge of the screen is longer than the distance from its bottom edge, and the angle between the viewing direction of the user and the optical axis of the picture screen is 5° to 30°, particularly about 20°, wherein the recording part of the video camera is located in such a way above or on the side, preferably in the area of the upper third of the image surface, next to the end of the display screen, wherein the optical axis of the lens forms a maximum angle of 6° with the viewing direction at a viewing distance of about 50 to 70 cm, particularly about 60 cm, when located above the top edge of the display screen, and a maximum angle of 8° when located next to the lateral edge of the display screen.

In still further accord with the first aspect of the present invention, a roof-shaped aperture is provided above the recording part of the video camera, whose inclination and/or projection is adjustable.

According further to the first aspect of the present invention, the housing has at least one sound louvre in the front below the picture screen, with a loudspeaker located behind it, wherein the housing has an open housing part in the area of the loudspeaker, which is shaped or attachable to the sound louvre and forms a closed loudspeaker box with respect to the housing, and wherein in the housing wall above the picture screen, at least one sound louvre is provided for a microphone located behind it, which is diagonal with respect to the sound louvre for the loudspeaker, and can be mechanically disconnected.

According still further to the first aspect of the present invention, at least one hinge or linkage is provided between the top housing part surrounding the picture screen and the bottom housing part surrounding the loudspeaker, and wherein the top housing part can be adjusted with respect to the bottom in such a way, that the angle of inclination of the optical axis of the picture screen can be varied with respect to the horizontal, and/or the top housing part and the bottom housing part can be folded together.

Still further in accordance with the first aspect of the present invention, the video-telephony screen comprises two module units, which can be electrically or mechanically connected or linked to each other by plug connections and/or attachment means, where the first module unit comprises at least the picture screen, video camera, camera electronics, loudspeaker, microphone and receiver for the remote control of the subscriber device, and wherein the second module unit comprises

telecommunication installations allocated to the first module unit, which can also operate separately, such as a handset rest with handset, dialing keyboard, function keyboard, power pack, fan, etc., and the second module unit can be exchanged with similar or other module units.

According to a second aspect of the present invention, a subscriber device for video telephony with a backwards inclined display screen and an adjacent video camera, whose path of rays is directed towards the user, has the video camera located immediately above the picture screen and has a portrait lens with a focal length of f = 12 mm and a 14-inch display screen, wherein at a distance of 115 cm between the user and the video camera, the angle between the horizontal and the vision contact line of the user to a calling party on the picture screen is about 10°, wherein the angle between this vision contact line and the line of vision to the video camera is about 5.5°, and wherein its optical axis can be adjusted to an angle of inclination of ± 5° above or below the horizontal.

According to a third aspect of the present invention, a subscriber device for video telephony with a backwards inclined display screen and an adjacent video camera, whose path of rays is directed towards the user, has the video camera located immediately above the picture screen and has a wide angle lens with a focal length of f = 6 mm and the display has a 14-inch screen, and wherein at a distance of 85 cm between the user and the video camera, the angle between the horizontal and the vision contact line of the user to a calling party on the picture screen is about 10°, wherein the angle between this vision contact line and the line of vision to the video camera is about 5.5°, and wherein its

optical axis can be adjusted to an angle of inclination of 0° to 10° below the horizontal.

According to a fourth aspect of the present invention, a subscriber device for video telephony with a backwards inclined display screen and an adjacent video camera, whose path of rays is directed towards the user, has the video camera located immediately above the picture screen and has a wide angle lens with a focal length of f = 6 mm and the display has a 5.7-inch screen, wherein at a distance of 55 to 85 cm between the user and the video camera, the angle between the horizontal and the vision contact line of the user to a calling party on the picture screen is 18° to 10°, wherein the angle between this vision contact line and the line of vision to the video camera is 5° to 3°, and wherein its optical axis can be adjusted to an angle of inclination of ± 5° above or below the horizontal.

According to a fifth aspect of the present invention, a subscriber device for video telephony with a backwards inclined display screen and an adjacent video camera, whose path of rays is directed towards the user, has the video camera located immediately above the picture screen and has a normal lens with a focal length of f = 8.5 mm and the display has a 10-inch screen, wherein at a distance of 70 to 100 cm between the user and the video camera, the angle between the horizontal and the vision contact line of the user to a calling party on the picture screen is 18° to 10°, wherein the angle between this vision contact line and the line of vision to the video camera is 5° to 3°, and wherein its optical axis can be adjusted to an angle of inclination of ± 8° above or below the horizontal.

These and other objects, features and advantages of the present invention will become more apparent in light

of the detailed description of a best mode embodiment thereof, as illustrated in the accompanying drawing.

Brief Description of the Drawing

Fig. 1 shows optical-geometrical relationships between a user and a device, according to the present invention;

Fig. 2 is a side view, according to the present invention, of a configuration of a subscriber device for video telephony in a partial cross section;

Fig. 3 is the front view of the device of Fig. 2, and

Fig. 4 is the rear view of the configuration according to Fig. 2;

Fig. 5 is a side view, according to the present invention, of a configuration with a pivoting housing that contains the display screen;

Fig. 6 is a side view, according to the present invention, of a configuration of a subscriber device with other telecommunications module units;

Fig. 6a is the same view as in Fig. 6, but prior to the assembly of an additional module unit, consisting of the handset and its rest;

Fig. 7 is the front view of Fig. 6, and

Fig. 8 is the top view of the subscriber device according to Fig. 6.

Best Mode for Carrying Out the Invention

A subscriber device 1, according to the present invention, is shown in Fig. 1. The configuration of the housing is not illustrated, since it is not important for the description of the geometric relationships. A video camera 11 and a display screen 3 are indicated schematically.

A vision contact line 4 (eye-to-eye) between the user B and a calling partner P on the display screen 3 is inclined at an angle γ against the line of vision 5 to the lens of the video camera 11. Angle β is formed by the vision contact line 4 and a horizontal plane H. On the other hand, an angle formed an the optical axis 16 of the video camera 11 and the horizontal H is identified by α. Line F symbolizes a focal plane of video camera 11, its length corresponds to the height of the picture window. The distance from the user B to the image plane of video camera 11 is indicated by the letter a.

The preferred, ergonomically comfortable line of vision is inclined by $\beta = 10°$ towards the horizontal H. It is the direct line 4 between the eyes of user B and the eyes of the depicted calling partner P, and represents thereby the intended "eye contact", which can be maintained for a long time without fatigue. Such a lowered line of vision occurs because of the fact that the picture of the display screen 3 most often represents a "reduced version of the calling partner". For ergonomic reasons, video telephone devices with particularly small display screens should be installed on a tripod or in a console, where the video camera would then approximately be chin-high.

In known parallax-free video telephones, the angle γ between lines 4 and 5, which is occasionally also described as "loss angle", reaches the intended value of 0°, because the angle formed with the vision contact line 4 can be identical if a precisely adapted semitransparent mirror is used. However, test results have shown that even with a loss angle of 8°, 85% of the test persons still felt viewed.

The best suited picture window was determined to be a portrait window "with the widest possible personality representation". With this picture window, the properly

adjusted video camera 11 acquires the full upper part of the body, so that, in addition to facial expressions, gestures (in other words, hand and arm movements of all kinds) can also be transmitted to the calling partner P as desirable nonverbal information. At a distance of a = 115 cm, this picture window corresponds to a diagonal picture angle of about 35°; thus approximating a lens with a focal length of f = 12 mm for the presently common ½-inch CCD cameras. The eyes of a single individual are then at about ⅔ of the picture height.

The subscriber device 1 may be a table model and can be placed at the edge of a desk, so that sufficient working space is available in front of the device. This makes it easy to find a suitable place for the planned call in front of the device, so that the calling partner P receives an advantageous picture, since the video camera 11 pictures a scene in the range of about 70 cm x 95 cm. With this large action space, the user B can not only be comfortable, but he can also elucidate some of the conversation with gestures. Even with moderate office light, where the camera sets its lens to an aperture of f 2.8 for example, a depth of focus of over 45 cm would still be available.

The pleasantly large picture size is not achieved by a wide-angle effect of the lens, but advantageously through a relatively far removed "normal lens". At about the height of user B's mouth, the video camera 11 is slightly inclined below the horizontal H at an angle α of 1° to the center of the "portrait" and thus avoids the dreaded frog perspective. A moderate zoom-lens can be installed in the video camera, so that user B can occasionally change from a wide-angle presentation to a limited target picture. The existing geometry allows him to easily adjust to smaller picture angles (thus "tele" effects), since variations with smaller picture angles

(thus portrait objectives) can easily be realized, because the geometry limits are then more advantageous.

The camera position in the subscriber device 1 is chosen so that line 5 from the eyes to the lens practically coincides with line 4 of the "vision contact" with the eyes of the calling partner P. The precise deviation of the two lines is at most an angle difference of $\gamma \approx 5.5°$, so that a "lack of view" is not noted by the partner in most instances.

If a 14-inch monitor is used as the display screen 3 of a common standard video telephone, it should be at a distance of about 110 cm from the user so that the line scan does not disturb the view.

In that case the subscriber device provides a sufficiently large picture, so that facial expressions and gestures of the calling partner are clearly visible. This creates the illusion that the partner looks out through a smaller 22 cm x 28 cm window into the 110 cm distance. This corresponds to about one third of the angle at which the partners see each other when they are face to face.

If a video camera 11 with a shorter focal length lens, e.g. f = 6 mm, is used in another configuration, the distance must be reduced to 85 cm, which can be necessary or advantageous from the point of view of space. The angles of inclination of lines 4 and 5 may be kept as before, in other words $\beta = 10°$ and $\gamma = 5.5°$, i.e. the desired 10° inclination of the vision contact line 4 to the calling partner P on the picture screen 3' of monitor device 3 remains intact. Since the cited lens of the video camera 11 has a significantly larger viewing angle, the picture size assumes a height of 70 cm. The optical axis 16 may be slightly more inclined than with the above described configuration, i.e. the angle α can

increase to about 5° below the horizontal H, in order to properly place the "portrait" into the picture.

A 5.7-inch monitor may be used as the display screen 3 for example, to reduce the size of subscriber device 1. When using the same video camera 11 as with the above described configuration (f = 6 mm) and the same distance a of 85 cm, the same values also apply to the picture size. If the inclination of β = 10° is maintained for the vision contact line 4, the parallax γ can be reduced to 3°, since the video camera 11 can be placed lower, because of the smaller monitor.

This subscriber device 1 can be advanced to a distance of a = 55 cm from the user B. The picture size then still has a height of 45 cm, however, the inclination of the video camera 11 must be raised to 3° above the horizontal H, in order to properly place the user B into the picture. Still, picture distortions cannot be avoided at such small distances. Furthermore, the angle of inclination β of the vision contact line 4 with respect to the horizontal H increases to 18°, and the line of vision 5 to the video camera 11 lens to 13°. This results in a parallax γ = 5°, a loss angle which is not perceived by the calling partners as a deviation from the vision contact. Because of the possibility of adjusting the inclination of the optical axis 16 of the video camera 11 individually, it is left to the user B to select the distance a, thereby the distance from the picture, in accordance with his needs.

To produce the subscriber device 1 in a particularly cost-effective manner, but still for good vision contact, a 10-inch display screen and a cost-effective 1/3-inch video camera 11 with a normal lens with a focal length of f = 8.5 mm are used. The distance a from user B to the video camera may be between 70 and 100 cm. The angle of inclination β between the vision

contact line 4 and the horizontal H is then about 18° to 10°, that of the line of vision 5 to the video camera 11 lens between 13° and 7°. The resulting parallax γ has values between 5° and 3°, which are vastly below the required value of 8°. The inclination of the optical axis 16 of the video camera 11 must be adjustable by $\alpha = \pm 8°$ above or below the horizontal H.

In all instances, the eye level of user B is assumed to be 45 cm above the table surface on which the device is located, which corresponds to the average.

If a video telephone is designed exclusively for a small picture size corresponding to a passport portrait, the camera is equipped with a "normal lens" or a "short tele", and the smaller picture angles allow the components to be brought closer together. The dimensions can therefore still be reduced further.

The following advantages are useful when assembling the camera and monitor, in relation to the respective emphasis: with a strong light, the depth of focus of the camera can be increased by selecting smaller apertures, or the light of the working space can be reduced for the comfort of the user. The effect of extraneous light is significantly less disturbing and the monitor picture has the best brilliance, and can even be increased with a common contrast filter. If the camera is equipped with an electronically integrated "CCD-aperture" (charged coupled device), the depth of focus can still be adjusted as desired with an additional, manually operated iris. This iris only needs to be opened further manually, or automatically by remote control, with extremely low light.

In Figs. 2 to 4, a subscriber device for video telephony or a multimedia system is again described by reference numeral 1. It includes a housing 2, in which a display monitor 3 is located with a screen 3', and its

outward facing picture surface 3". The arrangement is chosen so that its optical axis 6 is inclined at an angle ϵ of 5° to 30°, particularly about 20° with respect to the direction of vision or vision contact line 4 of a viewer or user B who is about 50 to 70 cm, particularly about 60 cm, away from the center point M of the picture surface 3". The distance between the viewer B and the top edge 9 of the picture surface 3" or the picture screen 3' is therefore larger than the distance to the bottom edge 10 of the screen. The angle δ between the optical axis 6 of the picture screen 3' and the horizontal H is about 10° to 40°, particularly about 30°.

The recording part of a video camera 11 is located immediately above the top edge 9 forming the upper limit of the display screen, comprising a lens 12 and an image converter 13, placed either entirely or at least partially before the picture surface 3". It forms a picture recording device, together with the camera electronics 14 located behind the display screen 3. The recording part of the video camera 11 and the camera electronics 14 are connected by a bus cable.

The video camera 11 is inclined so that, at a distance of about 50 to 70 cm of the viewer B from the center point M of the picture, particularly about 60 cm, the optical axis 16 of lens 12 forms a maximum angle ϕ of 6° with the viewing direction 4 of viewer B. This angle ϕ is so small, that it is not perceived by the calling partner as a loss angle, in other words not as a parallax error, when the viewer image, recorded by the video camera 11, is transmitted to the other end of the communication path. It is also useful for the video camera 11 to be located centrally, thus on or near the vertical centerline 17 of screen 3'. This practically eliminates a lateral loss angle entirely, which

contributes significantly to the imperceptible parallax resulting from the vertical loss angle ϕ.

The video camera 11 can also be located next to the lateral edge 18 of the display screen (not illustrated), possibly at the eye level of the partner or the partner's picture, generally the upper third of the screen surface 3". This achieves a maximum lateral loss angle ϕ' of 8°, where the vertical loss angle ϕ is zero, or nearly zero. This arrangement also ensures that a parallax error from the partner is not perceived.

Above the video camera 11, a roof-shaped aperture 19 is either permanently attached, or has an insertable or adjustable form, and is either parallel to its optical axis 16, or slightly inclined, e.g. up to 10°. It may continue to the lateral aperture sections 20, 21. Aperture 19 and aperture sections 20, 21 may consist of a U-shaped aperture part, which can also be part of the housing 2. When using an adjustable aperture 19, the arrangement may be such, that the inclination and/or the projection of the aperture 19 can be controlled. If necessary, the aperture sections 20, 21 could be adjustable separately or together with aperture 19.

The housing 2, which has sound openings 23 in the front, is located under the picture screen 3'. Behind them is a loudspeaker 24. Purposefully, the loudspeaker 24 is surrounded by a housing part 25 that is open to the sound openings 23, which forms a closed loudspeaker box 26 with a volume of e.g. up to three liters, particularly about two liters, inside the housing 2. This permits to avoid acoustic requirements or influences between the loudspeaker 24 and other parts of the installation, or to reduce them to a level that is not disturbing. The housing part 25 may be a separate component, or may be built with the housing 2 during its manufacture, to form an integral component thereof.

A plug panel with similar or dissimilar plugs 30.1, 30.2, 30.3 is provided on the back side 28 of the bottom edge area 27 of housing 2. The plugs or a plug panel can also be located on one of the two side walls 31, 32, and also on the front, possibly as an addition.

Air inlet openings 33 can be provided in the bottom edge area 27 on the back side 28 and/or at least in one side wall 31, 32, and air outlet openings 36 can be provided in the top edge area 34 or on top of the housing 35. A chimney effect can then supply cool air to the display screen 3 and upwards along the camera electronics 14, for cooling purposes.

A sound opening 37 is provided in the housing wall above the top edge 9 of the display screen, in the front 22 or on the inside of an inserted aperture, behind which a microphone 38 is located. In order to achieve as small a coupling as possible between the loudspeaker 24 and the microphone 38, particularly for hands-free talking, they are placed diagonally and at the largest possible distance from each other, and mechanically decoupled, e.g. by a separation wall or by damping material. The microphone diaphragm is oriented towards the user B. It is useful to locate it, or make it installable, at the mouth level of the user.

As shown in Fig. 5, the subscriber device 1 can be built in two parts. To that effect, an upper housing part 39 with the picture screen 3', the video camera 11 and possibly the camera electronics 14 as well, can pivot around a lower housing part 40. A hinge 41 or a suitable linkage is provided for that purpose, so that the angle of inclination δ of the optical axis 6 of picture screen 3' can be adjusted with respect to the horizontal H. The linkage may be chosen so that the upper housing part 39 can be pivoted into a horizontal position 39',

illustrated in Fig. 5 by broken lines, e.g. for shipping purposes or as the idle position.

According to an advantageous development of the invention shown in Figs. 6 to 8, a first module unit 47 of the subscriber device 1, containing the picture screen 3', the video camera 11, the loudspeaker 24, the microphone 38 and the camera electronics 14, has attachment means and/or plug connections at least on one side, either the front 22 and/or the back side 28 and/or at least in one side wall 31, 32, which can operate with the corresponding connection means of a second module unit 48.

Fig. 6a depicts the two module units 47 and 48 in the separated condition. The second module unit 48 comprises, for example, electrical and/or mechanical installations, which coordinate, or can be coordinated, with the first module unit 47, and possibly others that can also operate independently. For example, the second module unit may contain a handset installation 42 with a handset 43, a dialing keyboard 44, a function keyboard, a power pack 45, a fan etc., as well as additional telecommunication installations. The module units are designed so that the second module unit 48 can be interchanged with another similar one or of the same type, or a dissimilar one. This permits subscriber devices 1 with similar or dissimilar characteristics to be assembled in a simple way, where the housing dimensions are adapted to the circumstances, and always provide optimum compact functional units, or can convert existing ones in a simple manner.

Finally, a receiver 46 for acoustical and/or electromagnetic waves can be provided in the front side 22, or behind it, or on top. The receiver 46 can interact with a remote control transmitter, so that

adjustments can be made on the subscriber device 1 or on assigned additional installations.

According to an advantageous development of the invention, the lens 12 or the video camera 11 has focus adjusting means, e.g. an adjusting lever or a ring, which can be operated manually from the front 22. If the lens 12 does not extend, or does not extend far, beyond the front 22 or the picture surface 3", e.g. at least one funnel-shaped cavity 49 can be provided in the housing wall, as illustrated in Fig. 7, in which the focusing adjustment is located and can be actuated with the fingers. In the configuration in Fig. 7, two cavities 49 are formed by an oval-shaped funnel.

The invention permits to realize a compact subscriber device for video telephony, which, in addition to imperceptible parallax errors, offers a number of possibilities, particularly for application in multimedia systems.

CLAIMS

1. Subscriber device for video telephony with a backwards inclined display screen and an adjacent video camera, whose path of rays is directed towards the user, wherein only the recording part of the video camera (11), which comprises the lens (12) and the image converter (13), is located separately from the camera electronics (14) immediately above the top edge of the display screen (9) or immediately next to the lateral edge (18) of the display screen (3), and the camera electronics (14) are located behind the picture screen (3').

2. Subscriber device as in claim 1, wherein the image surface (3") of the picture screen (3') is inclined in such a way with respect to the horizontal (H), that the distance between the user (B) and the top edge (9) of the screen (3") is longer than the distance from its bottom edge (10), and the angle (ϵ) between the viewing direction (4) of the user (B) and the optical axis (6) of the picture screen (3') is 5° to 30°, particularly about 20°, wherein the recording part of the video camera (11) is located in such a way above or on the side, preferably in the area of the upper third of the image surface (3"), next to the end of the display screen, wherein the optical axis (16) of the lens (12) forms a maximum angle (ϕ) of 6° with the viewing direction (4) at a viewing distance of about 50 to 70 cm, particularly about 60 cm, when located above the top edge (9) of the display screen, and a maximum angle (ϕ') of 8° when located next to the lateral edge (18) of the display screen.

3. Subscriber device as in claim 2, wherein a roof-shaped aperture (19) is provided above the recording part of the video camera (11), whose inclination and/or projection is adjustable.

4. Subscriber device as in claim 2, wherein the housing (2) has at least one sound louvre (23) in the front (22) below the picture screen (3'), with a loudspeaker (24) located behind it, wherein the housing (2) has an open housing part (25) in the area of the loudspeaker (24), which is shaped or attachable to the sound louvre (23) and forms a closed loudspeaker box (26) with respect to the housing (2), and wherein in the housing wall (22) above the picture screen (3'), at least one sound louvre (37) is provided for a microphone (38) located behind it, which is diagonal with respect to the sound louvre (23) for the loudspeaker (24), and can be mechanically disconnected.

5. Subscriber device as in claim 4, wherein at least one hinge (41) or linkage is provided between the top housing part (39) surrounding the picture screen (3') and the bottom housing part (40) surrounding the loudspeaker (24), and wherein the top housing part can be adjusted with respect to the bottom (39; 40) in such a way, that the angle of inclination (δ) of the optical axis (6) of the picture screen (3') can be varied with respect to the horizontal (H), and/or the top housing part (39) and the bottom housing part (40) can be folded together.

6. Subscriber device as in claim 5, wherein it comprises two module units (47, 48), which can be electrically or mechanically connected or linked to each other by plug connections and/or attachment means, where the first module unit (47) comprises at least the picture screen (3'), video camera (11), camera electronics (14), loudspeaker (24), microphone (38) and receiver (46) for the remote control of the subscriber device (1), and wherein the second module unit (48) comprises telecommunication installations allocated to the first module unit (47), which can also operate separately, such as a handset rest (42) with handset (43), dialing keyboard (44), function keyboard, power pack (45), fan, etc., and the second module unit (48) can be exchanged with similar or other module units.

7. Subscriber device for video telephony with a backwards inclined display screen and an adjacent video camera, whose path of rays is directed towards the user, wherein the video camera (11) is located immediately above the picture screen (3') and has a portrait lens with a focal length of f = 12 mm and a 14-inch display screen (3), wherein at a distance (a) of 115 cm between the user (B) and the video camera (11), the angle (β) between the horizontal (H) and the vision contact line (4) of the user (B) to a calling party (P) on the picture screen (3') is about 10°, wherein the angle (γ) between this vision contact line (4) and the line of vision (5) to the video camera (11) is about 5.5°, and wherein its optical axis (16) can be adjusted to an angle of inclination (α) of ± 5° above or below the horizontal (H).

8. Subscriber device for video telephony with a backwards inclined display screen and an adjacent video camera, whose path of rays is directed towards the user, wherein the video camera (11) is located immediately above the picture screen (3') and has a wide angle lens with a focal length of f = 6 mm and the display (3) has a 14-inch screen, and wherein at a distance (a) of 85 cm between the user (B) and the video camera (11), the angle (β) between the horizontal (H) and the vision contact line (4) of the user (B) to a calling party (P) on the picture screen (3') is about 10°, wherein the angle (γ) between this vision contact line (4) and the line of vision (5) to the video camera (11) is about 5.5°, and wherein its optical axis (16) can be adjusted to an angle of inclination (α) of 0° to 10° below the horizontal (H).

9. Subscriber device for video telephony with a backwards inclined display screen and an adjacent video camera, whose path of rays is directed towards the user, wherein the video camera (11) is located immediately above the picture screen (3') and has a wide angle lens with a focal length of f = 6 mm and the display (3) has a 5.7-inch screen, wherein at a distance (a) of 55 to 85 cm between the user (B) and the video camera (11), the angle (β) between the horizontal (H) and the vision contact line (4) of the user (B) to a calling party (P) on the picture screen (3') is 18° to 10°, wherein the angle (γ) between this vision contact line (4) and the line of vision (5) to the video camera (11) is 5° to 3°, and wherein its optical axis (16) can be adjusted to an angle of inclination (α) of ± 5° above or below the horizontal (H).

10. Subscriber device for video telephony with a backwards inclined display screen and an adjacent video camera, whose path of rays is directed towards the user, wherein the video camera (11) is located immediately above the picture screen (3′) and has a normal lens with a focal length of f = 8.5 mm and the display (3) has a 10-inch screen, wherein at a distance (a) of 70 to 100 cm between the user (B) and the video camera (11), the angle (β) between the horizontal (H) and the vision contact line (4) of the user (B) to a calling party (P) on the picture screen (3′) is 18° to 10°, wherein the angle (γ) between this vision contact line (4) and the line of vision (5) to the video camera (11) is 5° to 3°, and wherein its optical axis (16) can be adjusted to an angle of inclination (α) of ± 8° above or below the horizontal (H).

ABSTRACT OF THE DISCLOSURE

A subscriber device (1) is presented, which is suitable for multimedia application, and permits a very compact construction by avoiding the use of mirrors, and provides freedom from parallax to the partner, in spite of an existing loss angle. The subscriber device (1) can be combined with other module units (48). Different configurations are proposed for the subscriber device (1), which make possible to maintain a parallax of less then 6° between the line of vision (5) to the video camera (11) and the vision contact line (4) to the calling partner (P) on the picture screen (3'), when using different screen sizes of display screen (3), and lenses of different focal lengths in the video camera (11).

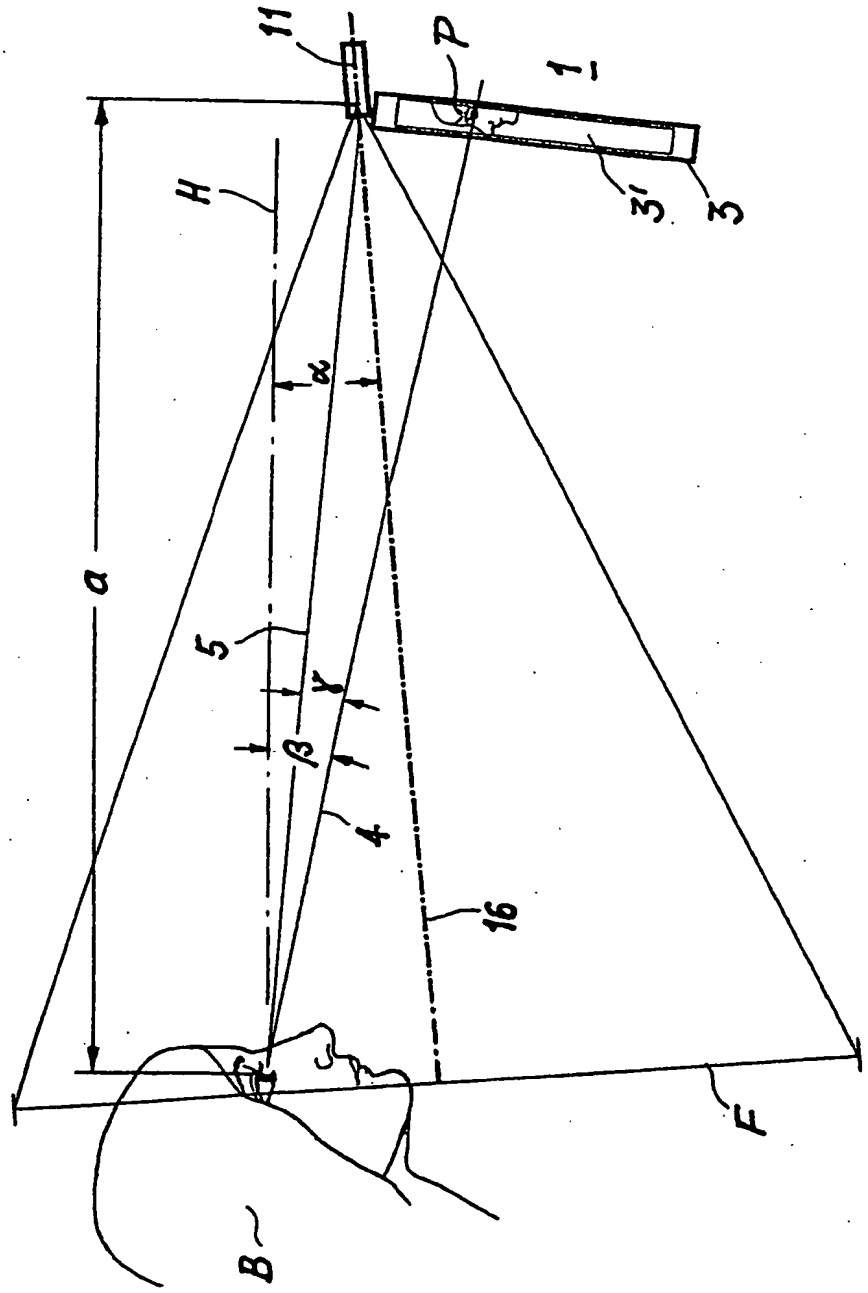

Fig 1

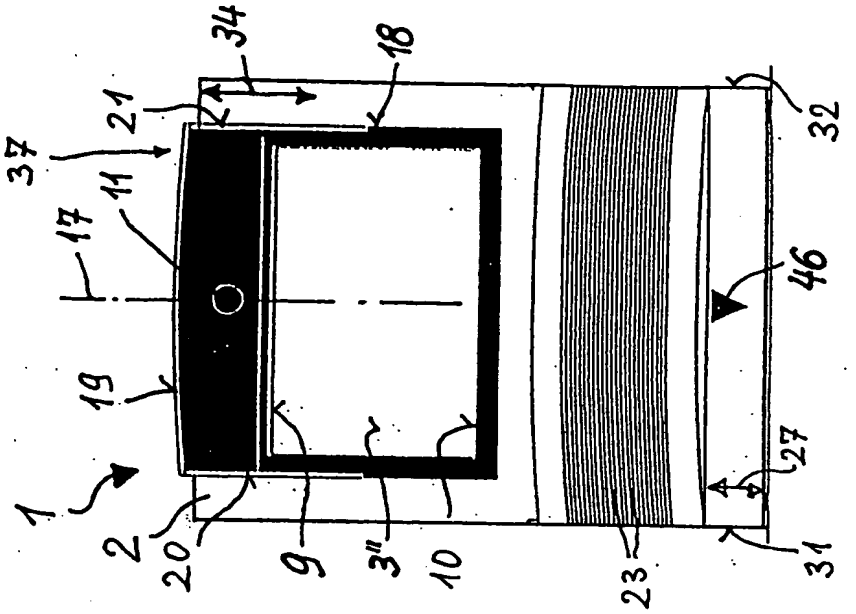
34
18
21
37
11
17
19
1
2
20
9
3"
10
23
31
32
46
27
A

Fig. 3

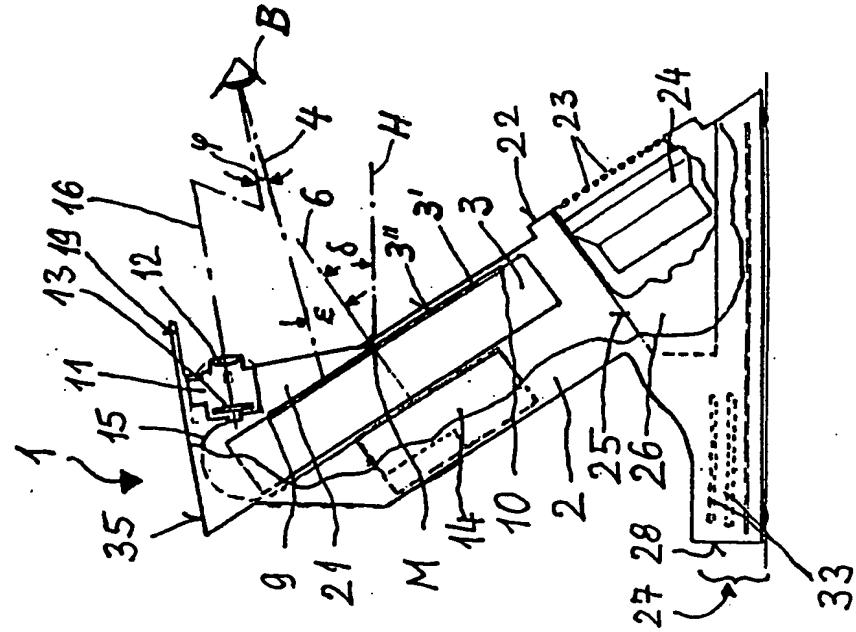
B
4
H
16
19
13
12
6
3"
3'
3
22
23
24
11
15
1
35
9
21
M
14
10
2
25
26
27
28
33

Fig. 2

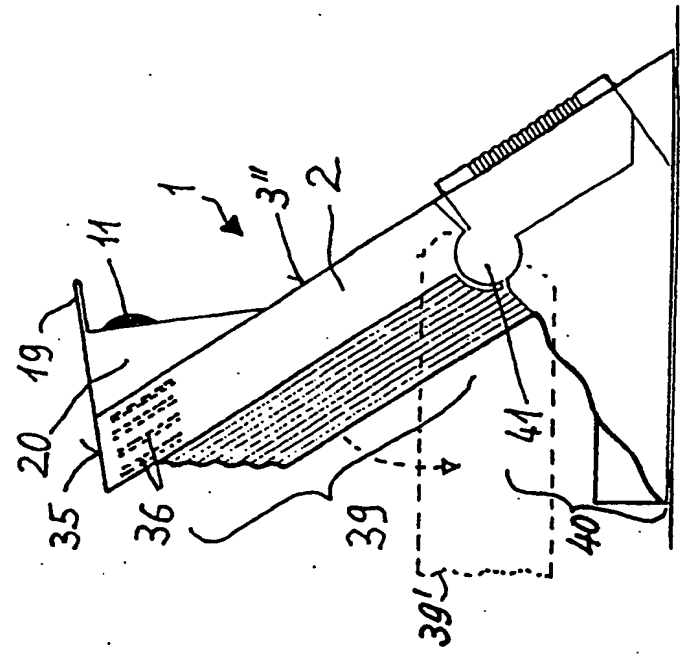
1
3"
2
11
19
20
35
36
39
39'
41
40

Fig. 5

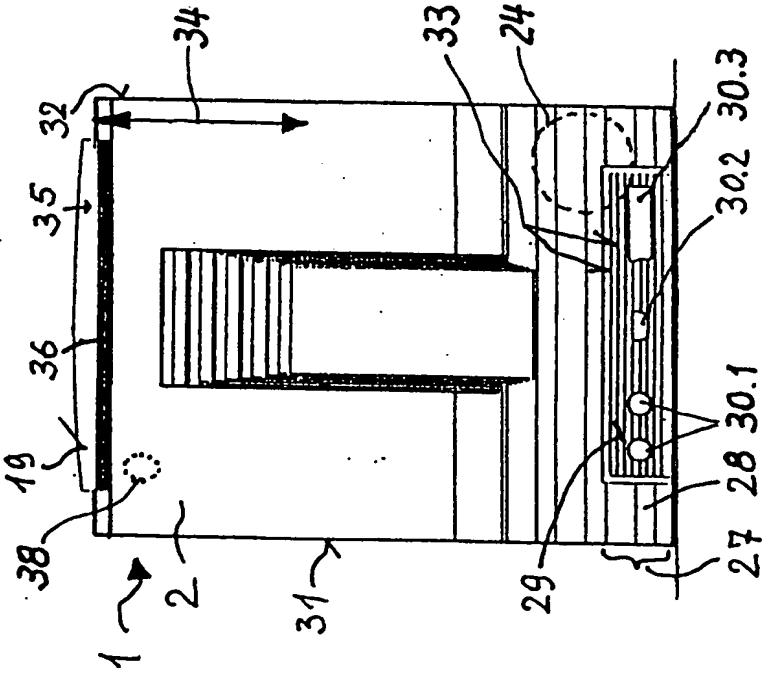
34
33
24
32
35
36
19
38
2
1
31
29
30.3
30.2
30.1
28
27

Fig. 4

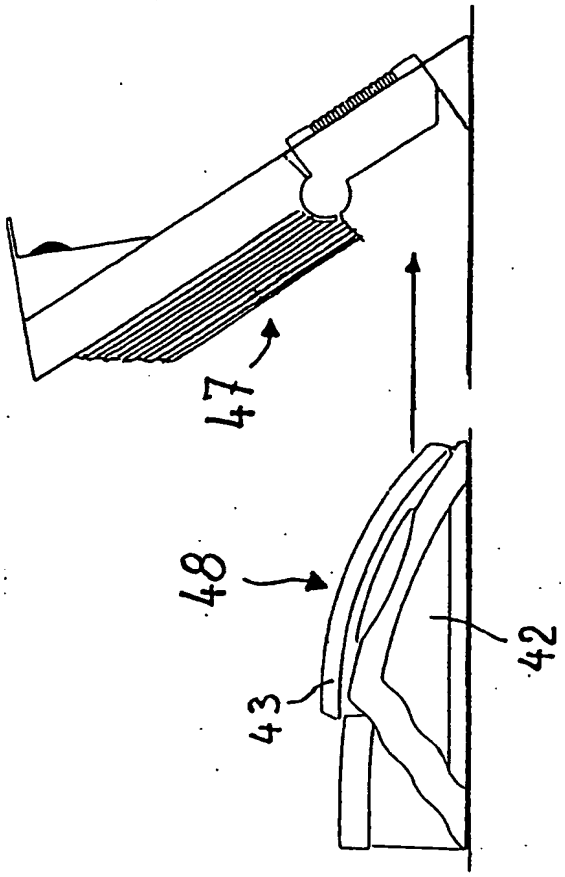

Fig. 6a

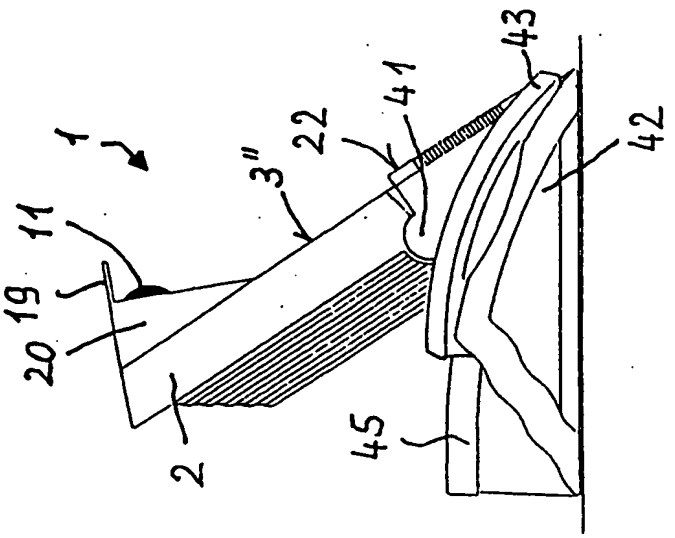

Fig. 6

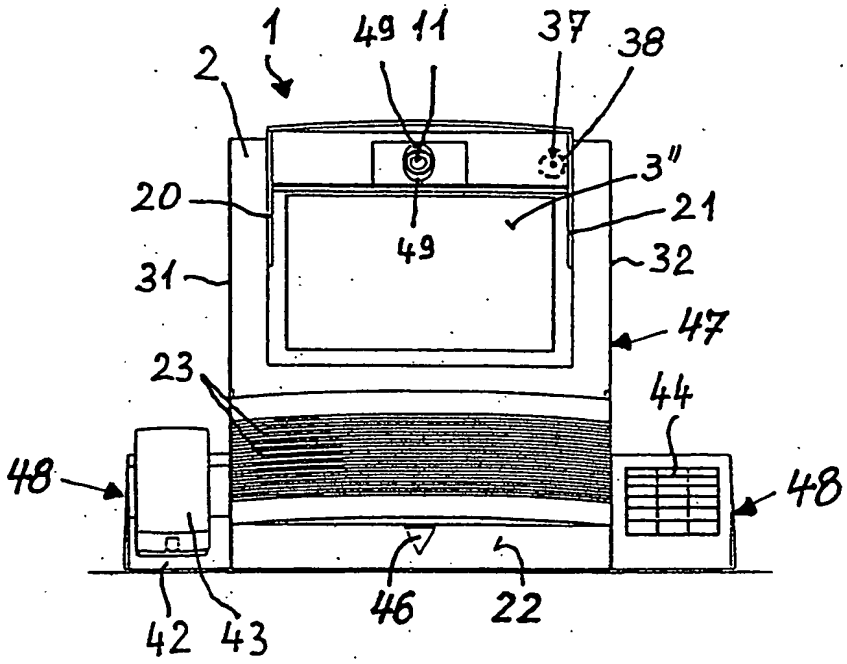
1
49
11
37
38
2
3"
20
21
49
31
32
47
23
44
48
48
46
22
42
43

Fig. 7

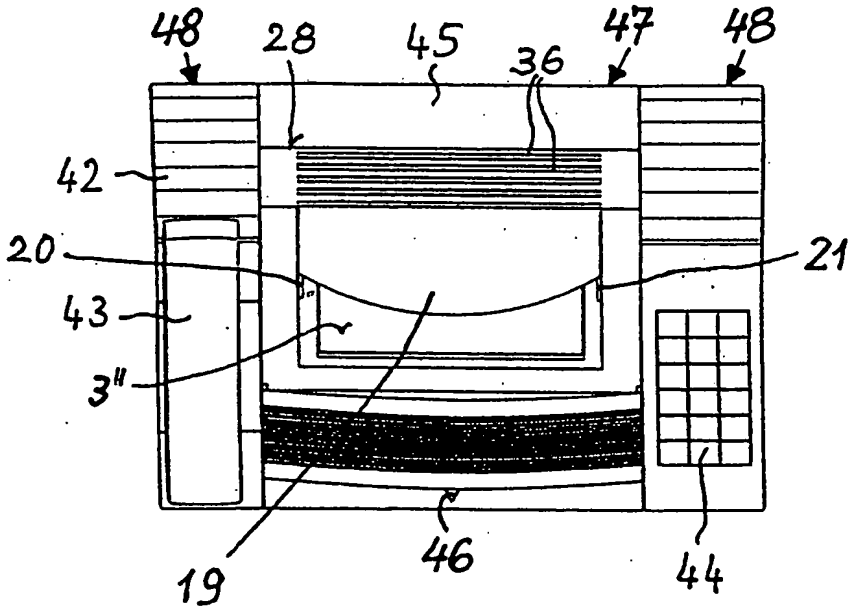
48
28
45
36
47
48
42
20
21
43
3"
19
46
44

Fig. 8